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1 Water Filter and Treatment System and Component

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3 The present invention relates to a water filter and
4 treatment component for use in host water treatment
5 apparatus, and a system therefor.

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7 In the production of treated and/or purified water,
8 for example ultra-pure water for laboratory use,
9 several components are generally used in conjunction
10 to provide the desired water quality. Some of these
11 components may be used in parallel or in series, and
12 some are more critical than others to the final
13 water quality. Nevertheless, the full and correct
14 performance of all the components is generally
15 essential to guarantee the treated water quality.

16

17 To ensure that the final water quality is of the
18 required standard, quality monitors are usually
19 installed either within or external to the water
20 purification unit to monitor key water parameters on
21 an ongoing basis. Typically these will include, but
22 are not limited to, resistivity, conductivity,

1 temperature, Total Organic Carbon (TOC), flow rate,
2 etc.

3

4 Notwithstanding the above monitoring, for certain
5 applications, industry regulations require
6 traceability of components that affect the final
7 water quality. Typically, this information is
8 required by companies producing pharmaceuticals or
9 similar products. Currently, this is generally
10 carried out by manual logging of component
11 information.

12

13 Meanwhile, components can often be installed and/or
14 used in more than one position in a water treatment
15 apparatus. In other situations, optimum performance
16 of the apparatus can be obtained by using the
17 components in different positions at different
18 instances. However, incorrect performance and/or
19 positioning cannot currently be prevented, which may
20 seriously undermine the water quality and
21 production.

22

23 Additionally, it is a desire to know how much
24 capacity or operational lifetime is retained within
25 a component. However, as most components are sealed
26 units, this is impossible to forecast before the
27 component suddenly expires or breaks down, again
28 potentially significantly affecting the water
29 production. This may cause inconvenience to the
30 user who would often prefer to schedule component
31 changes at specific times.

32

1 It is an intention of the present invention to
2 obviate the above disadvantages.

3

4 Thus, according to one aspect of the present
5 invention, there is provided a water treatment
6 component for use in a host water treatment
7 apparatus, wherein the component has an electronic
8 circuit adapted to co-operate with an electronic
9 circuit in the host apparatus. The host apparatus
10 and separable water treatment component together
11 comprise a water treatment system.

12

13 The co-operation may be one way, either from
14 component to host or vice versa, or two-way.

15

16 The component circuit and host circuit can
17 communicate via radio, infrared, or any other
18 transmittable waveforms including optical and
19 magnetic contact. Preferably, the circuits
20 communicate by physical electrical contact for
21 maximum robustness of connection, and to minimise
22 interference by other means of communication.

23 Preferably co-operation of the circuits is only
24 possible when the communication is correctly
25 created, and this is only achieved when the
26 component is correctly installed and/or fitted with
27 the host apparatus.

28

29 Each electronic circuit preferably includes a memory
30 capacity and a capability to read/interrogate the
31 other electrical circuit. The electrical circuit in
32 the host apparatus preferably includes a central

1 processor, and the electrical circuit in the
2 component preferably includes or is a data chip,
3 e.g. a microchip such as well known in the art.
4 The electronic circuit of the component is
5 preferably integral with the component, and more
6 preferably, is formed integrally with the component
7 during the component manufacture. The electronic
8 circuit is preferably embedded into or mounted onto
9 the component.

10
11 The electronic circuit of the component preferably
12 includes a database having relevant data relating to
13 that component such as validation information,
14 process information, and/or manufacturing
15 information. Typical information includes, but is
16 not limited to, date of manufacture, date of
17 testing, operator, cartridge type, media type(s),
18 media volumes, media lot numbers, quality control
19 details, and possibly a unique reference code.

20
21 The data of the component electronic circuit could
22 be encrypted.

23
24 According to one embodiment of the present
25 invention, the electronic circuit of the component
26 provides an enablement signal to the electronic
27 circuit of the host apparatus, and/or vice versa.

28
29 The enablement signal may include means for the
30 component or host to control the other part.
31 Preferably, the component and host inter-co-operate.
32

1 Information that can be communicated between the
2 electronic circuits of the component and host
3 generally include validation information, production
4 information and/or manufacturing information. Such
5 information in the component could be accessed from
6 the component and be displayed by the host
7 apparatus.

8

9 If necessary or desired, the same information in the
10 system could be accessed via a separate reader
11 device or otherwise communicated to a remote reader,
12 for analysis and/or display.

13

14 In typical operation, the electronic circuit of the
15 component includes at least a data tag, and the
16 presence of the data tag is identified by the
17 electronic circuit of the host apparatus upon
18 correct fitment and/or installation of the
19 component, which creates a two-way communication
20 protocol. The host apparatus can then upload
21 relevant data from the data tag, etc. and the
22 component's circuit can download the relevant
23 information from the host apparatus.

24

25 In another embodiment of the present invention, lack
26 of co-operation between the electronic circuit of
27 the component and electronic circuit of the host
28 apparatus indicates the incorrect fitment and/or
29 installation of the component with the host
30 apparatus, or incorrect location of a component on a
31 host apparatus where more than one location is
32 possible.

1 In another embodiment of the present invention, the
2 lack of co-operation between the electronic circuit
3 of the component and the electronic circuit of the
4 host apparatus identifies incorrect operation of the
5 component and/or host apparatus, e.g. a water leak.

6

7 The present invention extends to a water treatment
8 component as hereinbefore defined useable with a
9 host water treatment apparatus having a
10 co-operable electronic circuit, as well as a host
11 water treatment apparatus useable with a water
12 treatment component as hereinbefore defined, as well
13 as their co-operation to provide a water treatment
14 system. The electronic circuits of the component
15 and host apparatus can co-operate in a manner as
16 hereinbefore described.

17

18 In a further embodiment of the present invention the
19 water treatment component of the present invention
20 is a consumable and/or replacement unit such as a
21 cartridge. This includes water treatment units
22 containing ion exchange resins, filters, media, etc.

23

24 According to a yet further embodiment of the present
25 invention, a similar treatment component useable
26 with the host apparatus of the present invention is
27 an operational unit. Such operational units include
28 means to sanitise and/or clean e.g. by way of
29 disinfection and/or chemical cleaning, one or more
30 parts of the host apparatus. This may be by means
31 of a component that contains the sanitant or by the

1 fitment of dummy components in place of components
2 that may be damaged by the sanitant.

3

4 The present invention provides the benefits of
5 electrical co-operation and data tagging. These
6 include one or more of correct
7 installation/fitting/use of components, correct
8 location of relevant components in a host apparatus,
9 error-free transfer of information of component
10 origins and/or history, automatic start and/or use
11 of components such as sanitisation units, and
12 prevention of incorrect components, such as half-
13 used components, and out of date or inappropriate
14 components.

15

16 An embodiment of the present invention will now be
17 described by way of example only, and with reference
18 to the accompanying and diagrammatic Fig. 1 showing
19 a water treatment component and host water treatment
20 apparatus according to one embodiment of the present
21 invention.

22

23 Referring to Fig. 1, there is shown a first water
24 treatment component 2 and a host water treatment
25 apparatus 4. The host apparatus 4 has two component
26 locations, one shown ready to receive the first
27 component 2, and one shown fitted with a second
28 component 22.

29

30 The component 2 has an embedded microchip 6, which
31 can co-operate with an electronic interface 8 on the
32 host apparatus 4. The remaining part of the

1 electronic circuitry in the host apparatus 4 is not
2 shown.

3

4 The component 2 includes inlet and outlet water
5 ports 10a,12a, to fit with complementary inlet and
6 outlet water ports 10b,12b on the host apparatus.

7

8 The host apparatus includes a purified water outlet
9 14, and an electronic display 16.

10

11 The host apparatus 4 is a water purification unit,
12 and the component 2 is a consumable resin cartridge.

13

14 The microchip 6 includes a database retaining
15 product master records including date of manufacture
16 of the component 2, date of testing, operator,
17 cartridge type, media type (within the component),
18 media volume, media lot numbers, quality control
19 details, and a unique reference code. Only the
20 correct installation and fitting of the component 2
21 within the opening in the host apparatus 4, allows
22 the microchip 6 to engage and co-operate with the
23 interface 8 on the host unit 4.

24

25 Once the component 2 is fitted correctly, the
26 electronic circuitry in the host apparatus
27 identifies the presence of a data tag on the
28 component 2, such that a two-way communication
29 protocol is established. Once communication has
30 been made, the host apparatus 4 can upload relevant
31 data from the microchip data tag 6, and the micro
32 chip data tag 6 can download relevant information

1 from the host apparatus 4. The information uploaded
2 to the host apparatus includes performance
3 validation criteria such as lot numbers, dates and
4 content type and property. Information which is
5 downloaded into the microchip data tag 6 includes
6 date of commencement of operation and volume of
7 water used on an ongoing basis. The combination of
8 this information allows improvement in determination
9 of consumable lifetime.

10

11 Some or all of this information could be displayed
12 on the display 16 on the host apparatus 4. This
13 could include visual warning of any incorrect
14 operation, or end of life-time of the component 2.

15

16 Because the host apparatus electronic circuitry can
17 identify the presence, or not, of a data tag, it can
18 be used to prevent leaks from the apparatus 4, in
19 that if a component is not fitted correctly with its
20 data tag in place, then the apparatus 4 will not
21 operate and thus prevent leaks occurring.

22

23 Moreover, if the component 2 could be fitted in more
24 than one opening in the host apparatus 4, incorrect
25 fitment of the component 2 in the wrong position
26 could be prevented due to the unique identifier code
27 on each data tag. In this regard, Figure 1 shows a
28 second separable water treatment component 22. This
29 may provide the same function as the first component
30 2, or different. If different, an attempt to fit
31 the first component 2 into the location of the
32 second component 22 may provide an error signal or

1 sign through the display 16, thus ensuring that the
2 host apparatus 4 is not compromised.

3

4 The memory in the host apparatus electronic
5 circuitry could also detect if a particular data tag
6 has been previously used in a particular position,
7 and hence also prevent a situation where optimum
8 performance is not obtained. Furthermore, if
9 certain changes to the configuration of components
10 is required prior to carrying out such functions as
11 sanitisation then this configuration can be
12 ascertained prior to entering that mode.

13

14 The present provides a number of clear advantages,
15 including increased automation of information
16 logging, prevention of use of components in an
17 un-optimised manner, greater user awareness of
18 remaining operational life time of components, and
19 prevention of mis-connection/mis-installation which
20 could compromise final water quality, etc.